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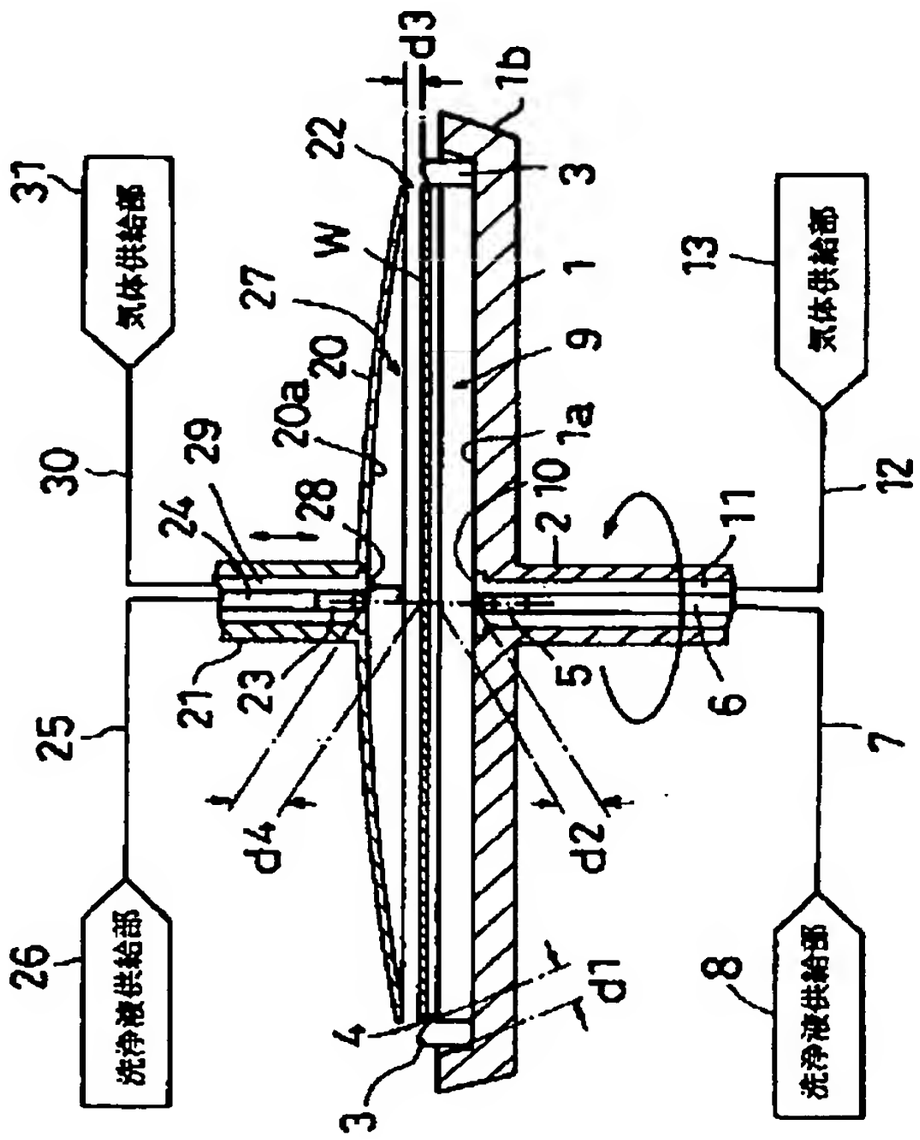
(54)【発明の名称】基板処理装置

(57)【要約】
【課題】　スピンベース側空間へ供給する気体の使用量を低減し、基板のスピンベース側の面の汚染を軽減する。
【解決手段】　所定の軸Ｊ回りに回転され、基板Ｗと対向する対向面を有するスピンベース１と、スピンベース１に設けられ、スピンベース１の対向面から離して基板Ｗを保持する基板保持部材３と、保持された基板Ｗのスピンベース１側の面とスピンベース１の対向面との間のスピンベース側空間９に気体を供給する気体供給手段とを備えた基板処理装置において、保持された基板Ｗの外周端部とスピンベース１との間の隙間４の間隔ｄ１を、保持された基板Ｗのスピンベース１側の面の中央部付近とその部分に対向するスピンベース１の対向面との間隔ｄ２よりも狭くした。



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【特許請求の範囲】
【請求項１】　所定の軸回りに回転され、基板と対向する対向面を有するスピンベースと、
前記スピンベースに設けられ、前記スピンベースの対向面から離して基板を保持する基板保持部材と、
前記基板保持部材に保持された基板のスピンベース側の面と前記スピンベースの対向面との間の空間に、前記スピンベースの対向面の回転中心部付近から気体を供給する気体供給手段と、
を備え、
前記基板保持部材に保持された基板の外周端部と前記スピンベースとの間の隙間の間隔を、前記基板保持部材に保持された基板の前記スピンベース側の面の中央部付近とその部分に対向する前記スピンベースの対向面との間隔よりも狭くするように構成したことを特徴とする基板処理装置。
【請求項２】　請求項１に記載の基板処理装置において、
前記スピンベースの周縁部に、前記基板保持部材に保持された基板側に折り返された折り返し部を備えたことを特徴とする基板処理装置。
【請求項３】　請求項２に記載の基板処理装置において、
前記折り返し部の折り返し角度θが、０°＜θ≦９０°であることを特徴とする基板処理装置。
【請求項４】　請求項１に記載の基板処理装置において、
前記スピンベースの対向面の形状が湾曲した凹面状であることを特徴とする基板処理装置。
【請求項５】　所定の軸回りに回転され、基板と対向する対向面を有するスピンベースと、
前記スピンベースに設けられ、前記スピンベースの対向面から離して基板を保持する基板保持部材と、
前記基板保持部材に保持された基板のスピンベース側の面と前記スピンベースの対向面との間の空間に、前記スピンベースの対向面の回転中心部付近から気体を供給する気体供給手段と、
前記スピンベースの周縁部またはその近傍に設けられ、前記基板保持部材に保持された基板の外周端部と前記スピンベースとの間の隙間から流れ出す気体の流れを妨げる抵抗部材と、
を備えたことを特徴とする基板処理装置。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は、所定の軸回りに回転され、基板と対向する対向面を有するスピンベースの対向面と基板保持部材に保持された基板のスピンベース側の面との間の空間に、スピンベースの対向面の回転中心部付近から不活性ガスやドライエアーなどの気体を供給する基板処理装置に関する。

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【０００２】
【従来の技術】従来のこの種の基板処理装置は、例えば、図１０に示すように構成されている。図１０に示す装置は、図示しないモーターに伝動連結されて軸Ｊ回りに回転される回転軸１０１の上端部に基板Ｗに対向する水平な対向面１０２ａを有する円板状のスピンベース１０２が一体的に連結され、スピンベース１０２の周縁部付近に３個以上の基板保持部材１０３が設けられている。基板Ｗは外周端部が基板保持部材１０３に３箇所以上で保持され、スピンベース１０２の対向面１０２ａから離れた状態で、正面から見て基板Ｗのスピンベース１０２側の下面とスピンベース１０２の対向面１０２ａとが平行になるように水平姿勢で保持される。
【０００３】基板保持部材１０３に保持された基板Ｗの上方には、基板Ｗの上面（この装置では表面）に平行に対向する対向面１０４ａを有する円板状の雰囲気遮断部材１０４が配置されている。この雰囲気遮断部材１０４は、アーム１０５を介して昇降自在に構成されていて、基板保持部材１０３に基板Ｗが保持されると、雰囲気遮断部材１０４が下降されて、図に示すように、保持された基板Ｗの上面に雰囲気遮断部材１０４の対向面１０４ａが近接配置される。
【０００４】この雰囲気遮断部材１０４の中心部には、基板保持部材１０３に保持された基板Ｗの上面に洗浄液を供給するノズル１０６が設けられている。このノズル１０６には、洗浄液供給管１０７を介して洗浄液が供給されるようになっている。また、ノズル１０６の周囲には、基板保持部材１０３に保持された基板Ｗの雰囲気遮断部材１０４側の上面と雰囲気遮断部材１０４の対向面１０４ａとの間の雰囲気遮断部材側空間１０８に、不活性ガスやドライエアーなどの清浄な気体を供給する気体供給口１０９が設けられている。この気体供給口１０９には、気体供給路１１０を介して気体が供給されるようになっている。
【０００５】また、スピンベース１０２の中心部には、基板保持部材１０３に保持された基板Ｗのスピンベース１０２側の下面（この装置では裏面）に洗浄液を供給するノズル１１１が設けられている。このノズル１１１には、回転軸１０１に内設された洗浄液供給管１１２を介して洗浄液が供給されるようになっている。さらに、ノズル１１１の周囲には、基板保持部材１０３に保持された基板Ｗの下面とスピンベース１０２の対向面１０２ａとの間のスピンベース側空間１１３に、気体を供給する気体供給口１１４が設けられている。この気体供給口１１４には、洗浄液供給管１１２と同軸に回転軸１０１に内設された気体供給路１１５を介して気体が供給されるようになっている。
【０００６】上記装置による洗浄・乾燥処理は以下のように行われる。まず、基板Ｗが基板保持部材１０３に保持されると、雰囲気遮断部材１０４が下降される。次

に、回転軸１０１を回転させて保持した基板Wを軸Ｊ回りに回転させ、ノズル１０６およびノズル１１１から基板Wの上面および下面に洗浄液を供給して基板Wの両面に対する洗浄を行う。このとき、洗浄液がフッ化水素酸などのエッチング作用がある薬液であるような場合には、基板Wの表面（図の上面）に自然酸化膜が成長するのを抑制するために、気体供給口１０９から雰囲気遮断部材側空間１０８に不活性ガスが供給されて、雰囲気遮断部材側空間１０８が不活性ガス雰囲気に置換・維持されて洗浄処理が行われる。

【０００７】洗浄処理が終了すると、ノズル１０６、１１１からの洗浄液の供給を停止するとともに、基板Wの回転を継続して、基板Wに付着した洗浄液を振り切り乾燥させる。この乾燥の際、基板Wの上面および下面の乾燥を促進するために、気体供給口１０９から雰囲気遮断部材側空間１０８に気体を供給するとともに、気体供給口１１４からスピンベース側空間１１３に気体を供給するようにしている。

【０００８】

【発明が解決しようとする課題】しかしながら、このような構成を有する従来例の場合には、次のような問題がある。従来装置において、スピンベース１０２および基板Wを回転させながら、気体供給口１１４からスピンベース側空間１１３に供給された気体は、基板保持部材１０３に保持された基板Wのスピンベース１０２側の面の中心部から外周端部方向に流れ、基板保持部材１０３に保持された基板Wの外周端部とスピンベース１０２との間の隙間（以下、この隙間を「スピンベース側隙間」とも言う）１３０から外部に流れ出すことになる。基板Wのスピンベース１０２側の面の乾燥を促進するためには、基板Wのその面全面に気体が触れるようにスピンベース側空間１１３に気体が満たされる必要がある。従って、従来装置の構成では、スピンベース側隙間１３０から流れ出す気体を補うように新たな気体を気体供給口１１４から順次供給し続けなければならず、スピンベース側空間１１３へ供給する気体の使用量が多くなっていた。

【０００９】また、図１０に示す従来装置においては、スピンベース側隙間１３０からスピンベース側空間１１３に外部雰囲気が流れ込むことがあり、基板Wのスピンベース１側の面を汚染することもあった。

【００１０】本発明は、このような事情に鑑みてなされたものであって、スピンベース側空間へ供給する気体の使用量を低減するとともに、基板のスピンベース側の面の汚染を軽減することができる基板処理装置を提供することを目的とする。

【００１１】

【課題を解決するための手段】本発明は、このような目的を達成するために、次のような構成をとる。すなわち、請求項１に記載の発明は、所定の軸回りに回転され、基板と対向する対向面を有するスピンベースと、前記スピンベースに設けられ、前記スピンベースの対向面から離して基板を保持する基板保持部材と、前記基板保持部材に保持された基板のスピンベース側の面と前記スピンベースの対向面との間の空間に、前記スピンベースの対向面の回転中心部付近から気体を供給する気体供給手段と、を備え、前記基板保持部材に保持された基板の外周端部と前記スピンベースとの間の隙間の間隔を、前記基板保持部材に保持された基板の前記スピンベース側の面の中央部付近とその部分に対向する前記スピンベースの対向面との間隔よりも狭くするように構成したことを特徴とするものである。

【００１２】請求項２に記載の発明は、請求項１に記載の基板処理装置において、前記スピンベースの周縁部に、前記基板保持部材に保持された基板側に折り返された折り返し部を備えたことを特徴とするものである。

【００１３】請求項３に記載の発明は、請求項２に記載の基板処理装置において、前記折り返し部の折り返し角度θが、０°＜θ≦９０°であることを特徴とするものである。

【００１４】請求項４に記載の発明は、請求項１に記載の基板処理装置において、前記スピンベースの対向面の形状が湾曲した凹面状であることを特徴とするものである。

【００１５】請求項５に記載の発明は、所定の軸回りに回転され、基板と対向する対向面を有するスピンベースと、前記スピンベースに設けられ、前記スピンベースの対向面から離して基板を保持する基板保持部材と、前記基板保持部材に保持された基板のスピンベース側の面と前記スピンベースの対向面との間の空間に、前記スピンベースの対向面の回転中心部付近から気体を供給する気体供給手段と、前記スピンベースの周縁部またはその近傍に設けられ、前記基板保持部材に保持された基板の外周端部と前記スピンベースとの間の隙間から流れ出す気体の流れを妨げる抵抗部材と、を備えたことを特徴とするものである。

【００１６】

【作用】請求項１に記載の発明の作用は次のとおりである。基板保持部材に基板が保持され、スピンベースが所定の軸回りに回転されてスピンベースと基板がその軸回りに回転されながら、気体供給手段により、スピンベースの対向面の回転中心部付近から、基板保持部材に保持された基板のスピンベース側の面とスピンベースの対向面との間の空間に気体が供給されると、気体は基板保持部材に保持された基板のスピンベース側の面の中心部から外周端部へ流れる。

【００１７】この請求項１に記載の発明では、基板保持部材に保持された基板の外周端部とスピンベースとの間の隙間（以下、この隙間を「スピンベース側隙間」とも言う）の間隔が、基板保持部材に保持された基板のスピ

ンベース側の面の中央部付近とその部分に対向するスピンベースの対向面との間隔（以下、この間隔を「スピンベース側中央部間隔」とも言う）よりも狭くなるように構成しているので、スピンベース側隙間の間隔とスピンベース側中央部間隔とが同じである従来装置に比べて、基板保持部材に保持された基板のスピンベース側の面の中心部から外周端部へ流れる気体が、スピンベース側隙間から流れ出難くなり、スピンベース側隙間からの気体の流出量が少なくなる。従って、上記空間に気体を満たしておくために気体供給手段から新たに順次供給し続ける気体の供給量が従来装置よりも少なくなる。

【００１８】また、スピンベース側隙間の間隔がスピンベース側中央部間隔よりも狭いので、スピンベース側隙間の間隔とスピンベース側中央部間隔とが同じである従来装置に比べて、スピンベース側隙間から上記空間へ外部雰囲気が流れ込み難くなる。

【００１９】請求項２に記載の発明の作用は次のとおりである。すなわち、スピンベースの周縁部に、基板保持部材に保持された基板側に折り返された折り返し部を備えているので、この折り返し部に、流出しようとする気体があたり、スピンベース側隙間からの気体の流出量がさらに少なくなる。

【００２０】請求項３に記載の発明の作用は次のとおりである。すなわち、折り返し部の折り返し角度θが、０°＜θ≦９０°であるので、この折り返し部に、流出しようとする気体があたった後、流出とは逆方向へ気体が流れることになり、スピンベース側隙間から気体がされに流出し難くなり、スピンベース側隙間からの気体の流出量がさらに少なくなる。

【００２１】請求項４に記載の発明の作用は次のとおりである。すなわち、スピンベースの対向面の形状が湾曲した凹面状であるので、気体供給手段によりスピンベースの対向面の回転中心部付近から供給された気体は、湾曲した凹面状により上記空間全体に行き渡る。

【００２２】請求項５に記載の発明の作用は次のとおりである。すなわち、基板保持部材に保持された基板およびスピンベースが所定の軸回りに回転されながら、気体供給手段により、スピンベースの対向面の回転中心部付近から、基板保持部材に保持された基板のスピンベース側の面とスピンベースの対向面との間の空間に供給された気体は、基板保持部材に保持された基板のスピンベース側の面の中心部から外周端部へ流れ、スピンベース側隙間から流れ出ようとするが、この気体の流れは、スピンベースの周縁部またはその近傍に設けた抵抗部材によって妨げられる。従って、スピンベース側隙間から気体が流れ出難くなり、スピンベース側隙間からの気体の流出量が従来装置よりも少なくなるので、上記空間に気体を満たしておくために気体供給手段から新たに順次供給し続ける気体の供給量が従来装置よりも少なくなる。

【００２３】また、スピンベースの周縁部またはその近傍に抵抗部材を設けているので、スピンベース側隙間から上記空間へ流れ込もうとする外部雰囲気は抵抗部材に阻まれる。従って、従来装置に比べて上記空間へ外部雰囲気が流れ込み難くなる。

【００２４】なお、抵抗部材は、例えば、スピンベースの周縁部を基板保持部材に保持された基板の外周端部側に折り返すなどによってスピンベースと一体に構成してもよいし、スピンベースと別部材で構成してもよい。

【００２５】

【発明の実施の形態】以下、図面を参照して本発明の実施の形態を説明する。図１は、本発明の第１実施例に係る基板処理装置の構成を示す縦断面図である。

【００２６】スピンベース１は、図示しないモーターに伝動連結されて軸Ｊ回りに回転される回転軸２の上端部に一体的に連結され、軸Ｊ回りに回転可能に構成されている。このスピンベース１には、基板Ｗの外周端部を３箇所以上で保持するための３個以上の基板保持部材３が設けられている。

【００２７】基板Ｗは外周端部がこれら基板保持部材３に３箇所以上で保持され、スピンベース１から離れた状態で水平姿勢で保持される。

【００２８】スピンベース１は、基板Ｗに対向する水平面を有する水平部１ａと、水平部１ａの周囲（スピンベース１の周縁部）が基板保持部材３に保持された基板Ｗの外周端部側に折り返された折り返し部１ｂとを備えている。この水平部１ａと折り返し部１ｂとは一体の部材で構成してもよいし、円板状の水平部１ａの周囲に折り返し部１ｂを取付けるように別部材で構成してもよい。

【００２９】また、基板保持部材３に保持された基板Ｗの外周端部とスピンベース１との間の隙間（以下、この隙間を「スピンベース側隙間」とも言う）４の間隔ｄ１が、基板保持部材３に保持された基板Ｗのスピンベース１側の下面の中央部付近（例えば、中心部）とその部分に対向するスピンベース１の対向面（この実施例では水平部１ａの水平面）との間隔（以下、この間隔を「スピンベース側中央部間隔」とも言う）ｄ２よりも狭く（ｄ１＜ｄ２）なるように前記折り返し部１ｂが構成されている。

【００３０】スピンベース１の中心部には、基板保持部材３に保持された基板Ｗのスピンベース１側の下面（この実施例装置のように基板Ｗをスピンベース１の上方で保持する装置では通常は裏面になる）に洗浄液を供給するノズル５が設けられている。このノズル５には、回転軸２に内設された洗浄液供給管６や管７などを介して洗浄液供給部８から洗浄液が供給されるようになっている。

【００３１】また、ノズル５の周囲には不活性ガス（窒素ガスなど）やドライエアーなどの気体を、基板保持部材３に保持された基板Ｗのスピンベース１側の下面とスピンベース１の対向面との間のスピンベース側空間９に

供給する気体供給口１０が設けられている。この気体供給口１０には、洗浄液供給管６と同軸に回転軸２に内設された気体供給路１１や管１２などを介して気体供給部１３から気体が供給されるようになっている。

【００３２】基板保持部材３に保持された基板Ｗの上方には雰囲気遮断部材２０が設けられている。この雰囲気遮断部材２０はアーム２１に連結されていて、このアーム２１を介して図示しない昇降機構により雰囲気遮断部材２０は基板保持部材３に保持された基板Ｗに対して接離するように昇降可能に構成されている。

【００３３】基板保持部材３に保持された基板Ｗの雰囲気遮断部材２０側の上面（この実施例装置のように基板Ｗをスピンベース１の上方で保持する装置では通常は表面になる）に対向する雰囲気遮断部材２０の対向面２０ａは、基板保持部材３に保持された基板Ｗの上面から見て湾曲した凹面状に構成されている。これにより、基板保持部材３に保持された基板Ｗの外周端部と雰囲気遮断部材２０の対向面２０ａとの隙間（以下、この隙間を「雰囲気遮断部材側隙間」とも言う）２２の間隔ｄ３が、基板保持部材３に保持された基板Ｗの上面の中央部付近（例えば、中心部）とその部分に対向する雰囲気遮断部材２０の対向面２０ａとの間隔（以下、この間隔を「雰囲気遮断部材側中央部間隔」とも言う）ｄ４よりも狭く（ｄ３＜ｄ４）なるように構成している。

【００３４】雰囲気遮断部材２０の中心部には、基板保持部材３に保持された基板Ｗの上面に洗浄液を供給するノズル２３が設けられている。このノズル２３には、アーム２１に内設された洗浄液供給管２４や管２５などを介して洗浄液供給部２６から洗浄液が供給されるようになっている。

【００３５】また、ノズル２３の周囲には不活性ガスやドライエアーなどの気体を、基板保持部材３に保持された基板Ｗの雰囲気遮断部材２０側の上面と雰囲気遮断部材２０の対向面２０ａとの間の雰囲気遮断部材側空間２７に供給する気体供給口２８が設けられている。この気体供給口２８には、洗浄液供給管２４と同軸にアーム２１に内設された気体供給路２９や管３０などを介して気体供給部３１から気体が供給されるようになっている。

【００３６】上記第１実施例装置による洗浄・乾燥処理は以下のように行われる。まず、基板Ｗが基板保持部材３に保持されると、雰囲気遮断部材２０が下降され、図１に示すように、雰囲気遮断部材２０が基板保持部材３に保持された基板Ｗに近接配置される。

【００３７】次に、回転軸２を回転させて保持した基板Ｗをスピンベース１とともに、軸Ｊ回りに回転させ、ノズル５およびノズル２３から基板Ｗの下面および上面に洗浄液を供給して基板Ｗの両面に対する洗浄を行う。このとき、洗浄液がフッ化水素酸などのエッチング作用があるような薬液である場合には、基板Ｗの表面（図の上面）に自然酸化膜が成長するのを抑制するために、気体

供給口２８から雰囲気遮断部材側空間２７に不活性ガスが供給されて、雰囲気遮断部材側空間２７が不活性ガス雰囲気に置換・維持されて洗浄処理が行われる。

【００３８】洗浄処理が終了すると、ノズル５、２３からの洗浄液の供給を停止するとともに、基板Ｗの回転を継続して、基板Ｗに付着した洗浄液を振り切り乾燥させる。この乾燥の際、基板Ｗの上面および下面の乾燥を促進するために、気体供給口２８から雰囲気遮断部材側空間２７に気体を供給するとともに、気体供給口１０からスピンベース側空間９に気体を供給する。

【００３９】さて、基板Ｗの下面（裏面）の乾燥の促進などのために、スピンベース側空間９に気体を供給した場合、この第１実施例装置では、図１に示すように、スピンベース側隙間４の間隔ｄ１を、スピンベース側中央部間隔ｄ２よりも狭くするように構成しているので、図１０に示すように、スピンベース側隙間１３０の間隔ｄ１１とスピンベース側中央部間隔ｄ１２とが同じ（ｄ１１＝ｄ１２）である従来装置に比べて、基板保持部材３に保持された基板Ｗのスピンベース１側の面の中心部から外周端部へ流れた気体がスピンベース側隙間４から流れ出難くなり、スピンベース側隙間４からの気体の流出量が少なくなる。

【００４０】また、スピンベース側隙間４から流れ出そうとする気体の流れは、スピンベース１の周縁部の折り返し部１ｂの内側面（スピンベース側空間９側の面）によって妨げられるので、そのことによってもスピンベース側隙間４から気体はさらに流れ出難くなり、スピンベース側隙間４からの気体の流出量が従来装置よりも少なくなる。

【００４１】従って、スピンベース側空間９に気体を満たしておくために気体供給口１０から新たに順次供給し続ける気体の供給量を従来装置よりも少なくでき、スピンベース側空間９に供給する気体の使用量を低減させることができる。

【００４２】また、スピンベース側隙間４の間隔ｄ１がスピンベース側中央部間隔ｄ２よりも狭いので、スピンベース側隙間１３０の間隔ｄ１１とスピンベース側中央部間隔ｄ１２とが同じである従来装置に比べて、スピンベース側隙間４からスピンベース側空間９へ外部雰囲気が流れ込み難くなる。

【００４３】さらに、スピンベース側隙間４からスピンベース側空間９へ流れ込もうとする外部雰囲気はスピンベース１の周縁部の折り返し部１ｂに阻まれることにもなるので、そのことによっても従来装置に比べてスピンベース側空間９へ外部雰囲気が流れ込み難くなる。

【００４４】従って、基板Ｗのスピンベース１側の下面の汚染を従来装置より軽減することができる。

【００４５】なお、スピンベース側中央部間隔ｄ２が１０㎜であるのに対して、スピンベース側隙間４の間隔ｄ１を１㎜にすると高い効果が得られたことが実験的に確

認できた。

【００４６】また、上記第１実施例では、図１に示すように、雰囲気遮断部材側隙間２２の間隔ｄ３を雰囲気遮断部材側中央部間隔ｄ４よりも狭くするように構成しているので、基板Ｗの上面（表面）の自然酸化膜の成長の抑制や乾燥の促進などのために、雰囲気遮断部材側空間２７に気体を供給する場合にも、基板Ｗとスピンベース１との関係と同様に、雰囲気遮断部材側隙間２２の間隔ｄ１３と雰囲気遮断部材側中央部間隔ｄ１４とが同じである従来装置（図１０参照）に比べて、基板保持部材３に保持された基板Ｗの雰囲気遮断部材２０側の面の中心部から外周端部へ流れた気体が雰囲気遮断部材側隙間２２から流れ出難くなり、雰囲気遮断部材側隙間２２からの気体の流出量が少なくなり、雰囲気遮断部材側空間２７に気体を満たしておくために気体供給口２８から新たに順次供給し続ける気体の供給量を従来装置よりも少なくでき、雰囲気遮断部材側空間２７に供給する気体の使用量を低減させることができる。

【００４７】また、雰囲気遮断部材側隙間２２の間隔ｄ３が雰囲気遮断部材側中央部間隔ｄ４よりも狭いので、雰囲気遮断部材側隙間２２から雰囲気遮断部材側空間２７へ外部雰囲気が流れ込み難くなり、基板Ｗの雰囲気遮断部材２０側の上面の汚染を従来装置より軽減することができる。

【００４８】次に、スピンベース側隙間４の間隔ｄ１をスピンベース側中央部間隔ｄ２よりも狭くするための変形例をいくつか紹介する。

【００４９】図２（ａ）に示すように、基板保持部材３に保持された基板Ｗの外周端部を通る鉛直線ＶＬよりもスピンベース１の中心部側の位置からスピンベース１の折り返し部１ｂを折り返すようにしてもよい。

【００５０】また、スピンベース１の折り返し部１ｂの折り返し角度θを、図２（ｂ）、（ｃ）に示すように、０°＜θ≦９０°にすれば、この折り返し部１ｂに、流出しようとする気体があたった後、流出とは逆方向へ気体が流れるので、スピンベース側隙間４からの気体が流出し難くなり、スピンベース側隙間４からの気体の流出量がさらに少なくなる。

【００５１】さらに、図２（ｄ）に示すように、スピンベース１の周縁部（折り返し部１ｂの周縁部）の上端１ｃが、基板保持部材３に保持された基板Ｗの下面を含む水平面ＨＰよりも下方になるように構成してもよいし、同程度、あるいは、若干上方になるように構成してもよい。

【００５２】また、図３（ａ）、（ｂ）に示すように、基板保持部材３に保持された基板Ｗの下面に対向するスピンベース１の対向面１ｄを、雰囲気遮断部材１の対向面２０ａと同様に、基板Ｗの下面から見て湾曲した凹面状にすれば、スピンベース１の対向面の回転中心部付近から供給された気体は、スピンベース側空間９全体に行き渡るようになる。なお、図３（ａ）では、スピンベース１を皿状の部材で構成したもので、図３（ｂ）は、円柱状のスピンベース１に上記構成の対向面１ｄが形成されるように凹部を設けたものである。

【００５３】また、図３（ａ）、（ｂ）では、スピンベース１の対向面１ｄを湾曲させたが、図３（ｃ）、（ｄ）に示すように、その湾曲部分を直線状の傾斜面で構成してもよい。

【００５４】なお、図４に示すように、スピンベース１の中心部付近に凸部１ｅを設け、この凸部１ｅにノズル５や気体供給口１０を設けているような場合には、スピンベース側中央部間隔ｄ２は、その凸部１ｅの周囲の間隔とする。

【００５５】また、スピンベース側隙間４の間隔ｄ１をスピンベース側中央部間隔ｄ２よりも狭くするためには、上記第１実施例やその変形例以外の構成でも実現することができることは言うまでもない。

【００５６】次に、雰囲気遮断部材側隙間２２の間隔ｄ３を遮断部材側中央部間隔ｄ４よりも狭くするための変形例をいくつか紹介する。

【００５７】上記第１実施例では、雰囲気遮断部材２０を皿状の部材で構成したが、図５（ａ）に示すように、円柱状の雰囲気遮断部材２０に湾曲した凹面状の対向面２０ａが形成されるように凹部を設けて構成してもよい。

【００５８】また、上記第１実施例の雰囲気遮断部材２０や図５（ａ）の変形例の雰囲気遮断部材２０の対向面２０ａの湾曲部分を、図５（ｂ）、（ｃ）に示すように、直線状の傾斜面で構成してもよい。

【００５９】さらに、図５（ｄ）に示すように、雰囲気遮断部材２０を上記第１実施例のスピンベース１と同様に、水平部２０ｂと折り返し部２０ｃを備えて構成してもよい。なお、このように構成した雰囲気遮断部材２０の折り返し部２０ｃについては、スピンベース１の折り返し部１ｂに関して図２で述べた変形例と同様に変形実施してもよい。

【００６０】また、雰囲気遮断部材側隙間２２の間隔ｄ３を雰囲気遮断部材側中央部間隔ｄ４よりも狭くするためには、上記第１実施例やその変形例以外の構成でも実現することができることは言うまでもない。

【００６１】上記第１実施例または図２、図３の各変形例の任意のスピンベース１と、上記第１実施例または図５の各変形例の任意の雰囲気遮断部材２０とを適宜に組み合わせて基板処理装置を構成してもよい。

【００６２】次に、本発明の第２実施例装置の構成を図６を参照して説明する。この第２実施例装置は、スピンベース側空間９に供給された気体がスピンベース側隙間４から流れ出す気体の流れを妨げるとともに、雰囲気遮断部材側空間２７に供給された気体が雰囲気遮断部材側隙間２２から流れ出す気体の流れを妨げる抵抗部材４０

を、スピンベース１の周縁部の近傍および雰囲気遮断部材２０の周縁部の近傍に設けたことを特徴としている。

【００６３】この抵抗部材４０はリング状の部材で構成され、図示しない昇降機構によってスピンベース１に対して昇降自在に構成されている。なお、抵抗部材４０の昇降は、雰囲気遮断部材２０と独立して行うように構成してもよいし、抵抗部材４０を雰囲気遮断部材２０に連結して、雰囲気遮断部材２０とともに昇降させるように構成してもよい。その他、第１実施例と共通する部分は、図１と同一符号を付してその詳述は省略する。

【００６４】このような抵抗部材４０を設けたことにより、スピンベース側空間９に供給され、基板保持部材３に保持された基板Wのスピンベース１側の面の中心部から外周端部へ流れ、スピンベース側隙間４から流れ出る気体の流れは、この抵抗部材４０によって妨げられるので、スピンベース側隙間４から気体が流れ出難くなる。従って、図６に示すように、スピンベース１を従来装置（図１０参照）と同様の構成にしていても、スピンベース側隙間４からの気体の流出量は従来装置よりも少なくなり、スピンベース側空間９に空気を満たしておくために気体供給口１０から新たに順次供給し続ける気体の供給量を従来装置よりも少なくでき、スピンベース側空間９に供給する気体の使用量を低減させることができる。

【００６５】また、スピンベース側隙間４からスピンベース側空間９へ流れ込もうとする外部雰囲気は抵抗部材４０に阻まれるので、従来装置に比べて、スピンベース側空間９へ外部雰囲気が流れ込み難くなり、基板Wのスピンベース１側の下面の汚染を従来装置より軽減することができる。

【００６６】また、雰囲気遮断部材側空間２７に供給され、基板保持部材３に保持された基板Wの雰囲気遮断部材２０側の面の中心部から外周端部へ流れ、雰囲気遮断部材側隙間２２から流れ出る気体の流れも抵抗部材４０によって妨げられるので、雰囲気遮断部材側隙間２２から気体が流れ出難くなる。従って、図６に示すように、雰囲気遮断部材２０を従来装置（図１０参照）と同様の構成にしていても、雰囲気遮断部材側隙間２２からの気体の流出量は従来装置よりも少なくなり、雰囲気遮断部材側空間２７に空気を満たしておくために気体供給口２８から新たに順次供給し続ける気体の供給量を従来装置よりも少なくでき、雰囲気遮断部材側空間２７に供給する気体の使用量を低減させることができる。

【００６７】また、雰囲気遮断部材側隙間２２から雰囲気遮断部材側空間２７へ流れ込もうとする外部雰囲気は抵抗部材４０に阻まれるので、従来装置に比べて、雰囲気遮断部材側空間２７へ外部雰囲気が流れ込み難くなり、基板Wの雰囲気遮断部材２０側の上面の汚染を従来装置より軽減することができる。

【００６８】なお、上記第２実施例装置では、スピンベース側空間９に供給された気体がスピンベース側隙間４から流れ出す気体の流れを妨げる抵抗部材と、雰囲気遮断部材側空間２７に供給された気体が雰囲気遮断部材側隙間２２から流れ出す気体の流れを妨げる抵抗部材とを一体の部材４０で構成しているが、図７に示すように、これら部材を別個に、すなわち、スピンベース側空間９に供給された気体がスピンベース側隙間４から流れ出す気体の流れを妨げるリング状の抵抗部材４０ａと、雰囲気遮断部材側空間２７に供給された気体が雰囲気遮断部材側隙間２２から流れ出す気体の流れを妨げるリング状の抵抗部材４０ｂとに分けて設けてもよい。

【００６９】また、抵抗部材４０ａは、例えば、第１実施例装置のスピンベース１や図２の変形例のスピンベース１の折り返し部１ｂのように、スピンベース１の周縁部に設けてもよい。抵抗部材４０ｂも同様に、雰囲気遮断部材２０の周縁部に設けてもよい。

【００７０】上記第２実施例やその変形例では抵抗部材をリング状の部材で構成しているがその他の形状、構成で抵抗部材を構成してもよい。

【００７１】また、抵抗部材４０を設けたことにより、スピンベース側空間９や雰囲気遮断部材側空間２７への気体の供給量の低減や基板Wの両面の汚染の軽減などの効果が得られるので、図６に示すように、スピンベース１や雰囲気遮断部材２０は従来装置と同様の構成（スピンベース側隙間の間隔とスピンベース側中央部間隔とが同じで、雰囲気遮断部材側隙間の間隔と雰囲気遮断部材側中央部間隔とが同じ）にしてもよいが、例えば、第１実施例装置やその変形例のようにスピンベース１または／および雰囲気遮断部材２０を構成するとともに、抵抗部材４０を設けるように構成してもよい。このように構成すれば、一層高い効果を得ることができる。

【００７２】次に、本発明の第３実施例装置の構成を図８を参照して説明する。この第３実施例装置は、基板Wをスピンベース１の下方で保持するように構成したことを特徴としている。この装置の基板保持部材５０は、例えば、図の矢印で示すように開閉自在に構成されていて、基板Wの外周端部を３箇所以上で挟持するように基板Wを保持する。このような構成の装置は、通常、基板Wの表面をスピンベース１側の上面にして処理される。その他の構成は、上記第１実施例と略同じであるので、共通する部分は図１と同一符号を付してその詳述を省略する。

【００７３】このような構成の装置であっても、第１実施例装置と同様の効果を得ることができる。また、第１実施例装置について説明した各変形例は、この第３実施例装置にも同様に適用することができる。

【００７４】図９に示す第４実施例装置は、上記第３実施例装置と同様に基板Wをスピンベース１の下方で保持するように構成した装置に、上記第２実施例装置と同様に抵抗部材４０を設けたものである。

【００７５】この第４実施例装置でも、第２実施例装置

と同様の効果を得ることができる。また、第２実施例装置について説明した各変形例は、この第４実施例装置にも同様に適用することができる。

【００７６】なお、上記各実施例では、雰囲気遮断部材２０を備え、雰囲気遮断部材側空間２７への気体の供給量の低減や基板Ｗの雰囲気遮断部材２０側の面の汚染の低減を図る工夫をこらしているが、本発明は、雰囲気遮断部材２０を備えていない装置に対しても同様に適用でき、スピンベース側空間９への気体の供給量の低減や基板Ｗのスピンベース１側の面の汚染の低減を図ることができる。

【００７７】また、上記第１、第３実施例装置の雰囲気遮断部材を従来装置と同様の構成の雰囲気遮断部材で構成したり、上記第２抵抗部材４０ｂを省いた構成（第４実施例装置も同様）にしたような装置においても、少なくともスピンベース側空間９への気体の供給量の低減や基板Ｗのスピンベース１側の面の汚染の低減は図ることができる。

【００７８】

【発明の効果】以上の説明から明らかなように、請求項１に記載の発明によれば、基板保持部材に保持された基板の外周端部とスピンベースとの間の隙間（スピンベース側隙間）の間隔を、基板保持部材に保持された基板のスピンベース側の面の中央部付近とその部分に対向するスピンベースの対向面との間隔（スピンベース側中央部間隔）よりも狭くするように構成したので、スピンベース側隙間の間隔とスピンベース側中央部間隔とが同じである従来装置に比べて、スピンベース側隙間からの気体の流出量が従来装置よりも少なくなる。従って、基板保持部材に保持された基板のスピンベース側の面とスピンベースの対向面との間の空間に気体を満たしておくために気体供給手段から新たに順次供給し続ける気体の供給量を従来装置よりも少なくでき、上記空間に供給する気体の使用量を低減させることができる。

【００７９】また、スピンベース側隙間の間隔がスピンベース側中央部間隔よりも狭いので、スピンベース側隙間の間隔とスピンベース側中央部間隔とが同じである従来装置に比べて、スピンベース側隙間から上記空間へ外部雰囲気が流れ込み難くなり、基板のスピンベース側の面の汚染を従来装置より軽減することができる。

【００８０】請求項２に記載の発明によれば、スピンベースの周縁部に、基板保持部材に保持された基板側に折り返された折り返し部を備えているので、この折り返し部に、流出しようとする気体があたり、スピンベース側隙間からの気体の流出量をさらに少なくできる。

【００８１】請求項３に記載の発明によれば、折り返し部の折り返し角度θが、$0° < \theta \leqq 90°$であるので、この折り返し部に、流出しようとする気体があたった後、流出とは逆方向げ気体が流れることになり、スピンベース側隙間からの気体はさらに流出し難くなり、スピンベース側隙間からの気体の流出量をさらに少なくできる。

【００８２】請求項４に記載の発明によれば、スピンベースの対向面の形状が湾曲した凹面状であるので、気体供給手段によりスピンベースの対向面の回転中心部付近から供給された気体は、上記空間全体になんべんなく行き渡らせることができる。

【００８３】請求項５に記載の発明によれば、基板保持部材に保持された基板のスピンベース側の面とスピンベースの対向面との間の空間に供給された気体がスピンベース側隙間から流れ出す気体の流れを妨げる抵抗部材を、スピンベースの周縁部またはその近傍に設けたので、スピンベース側隙間から流れ出す気体の流出量が従来装置よりも少なくなる。従って、上記空間に気体を満たしておくために気体供給手段から新たに順次供給し続ける気体の供給量を従来装置よりも少なくでき、上記空間に供給する気体の使用量を低減させることができる。

【００８４】また、スピンベースの周縁部またはその近傍に抵抗部材を設けているので、スピンベース側隙間から上記空間へ流れ込もうとする外部雰囲気は抵抗部材に阻まれ、従来装置に比べて上記空間へ外部雰囲気が流れ込み難くなり、基板のスピンベース側の面の汚染を従来装置より軽減することができる。

【図面の簡単な説明】

【図１】本発明の第１実施例に係る基板処理装置の構成を示す縦断面図である。

【図２】スピンベース側隙間の間隔をスピンベース側中央部間隔よりも狭くするための変形例の構成を示す部分断面図である。

【図３】スピンベース側隙間の間隔をスピンベース側中央部間隔よりも狭くするためのその他の変形例の構成を示す縦断面図である。

【図４】スピンベースの中心部に凸部が形成されている場合のスピンベース側中央部間隔を示す図である。

【図５】雰囲気遮断部材側隙間の間隔を雰囲気遮断部材側中央部間隔よりも狭くするための変形例の構成を示す縦断面図である。

【図６】本発明の第２実施例装置の構成を示す縦断面図である。

【図７】第２実施例装置の変形例の構成を示す縦断面図である。

【図８】本発明の第３実施例装置の構成を示す縦断面図である。

【図９】本発明の第４実施例装置の構成を示す縦断面図である。

【図１０】従来装置の構成を示す縦断面図である。

【符号の説明】

１　スピンベース
２　回転軸
３　基板保持部材

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4　スピンベース側隙間
9　スピンベース側空間
１０　スピンベース側の気体供給口
４０、４０ａ、４０ｂ　抵抗部材

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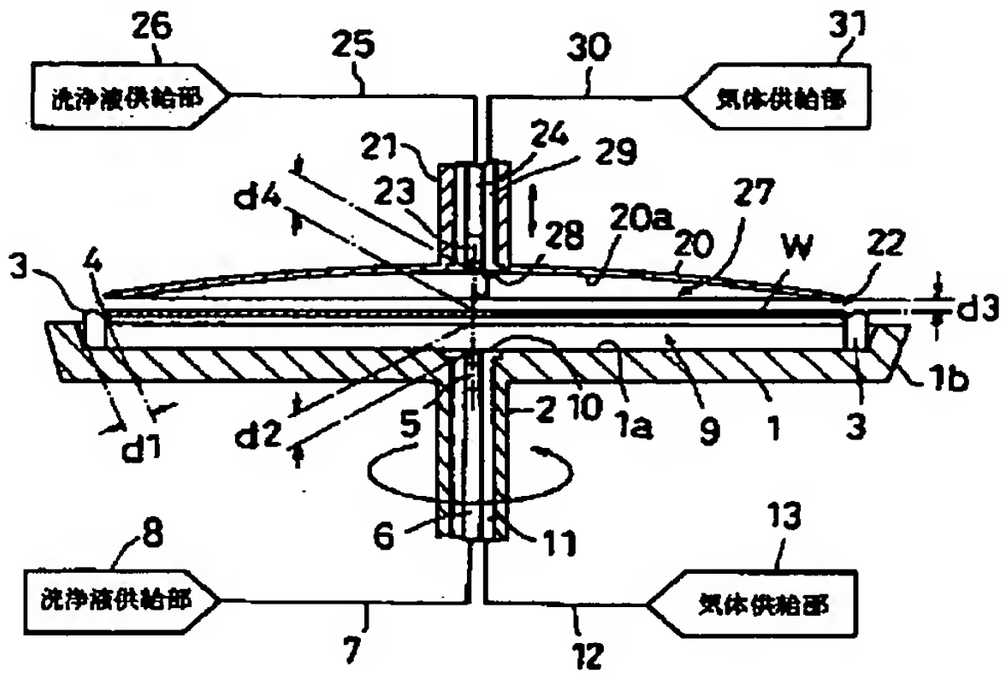
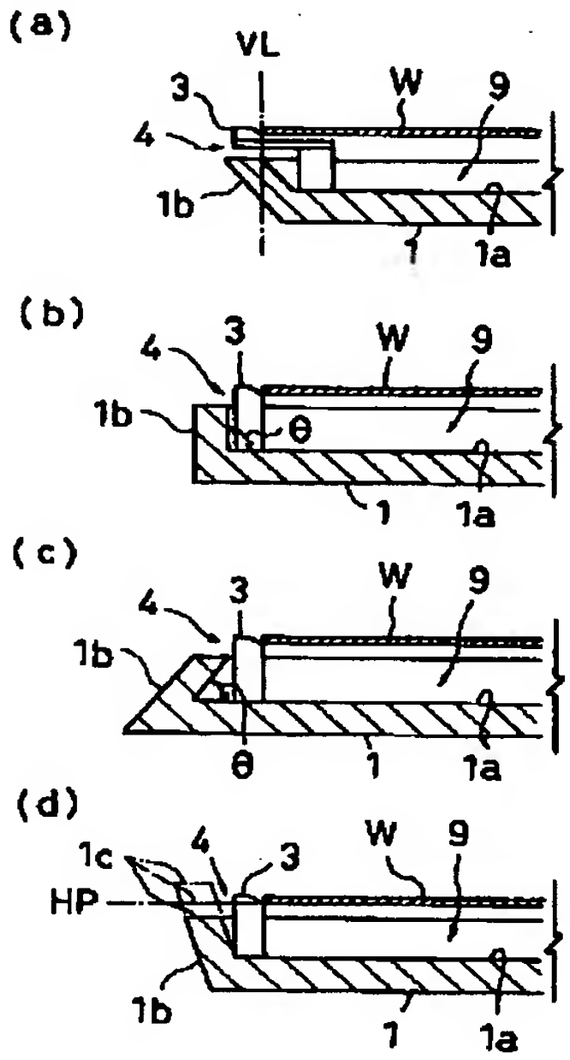
W　基板
J　基板を回転させる所定の軸
ｄ１　スピンベース側隙間の間隔
ｄ２　スピンベース側中央部間隔

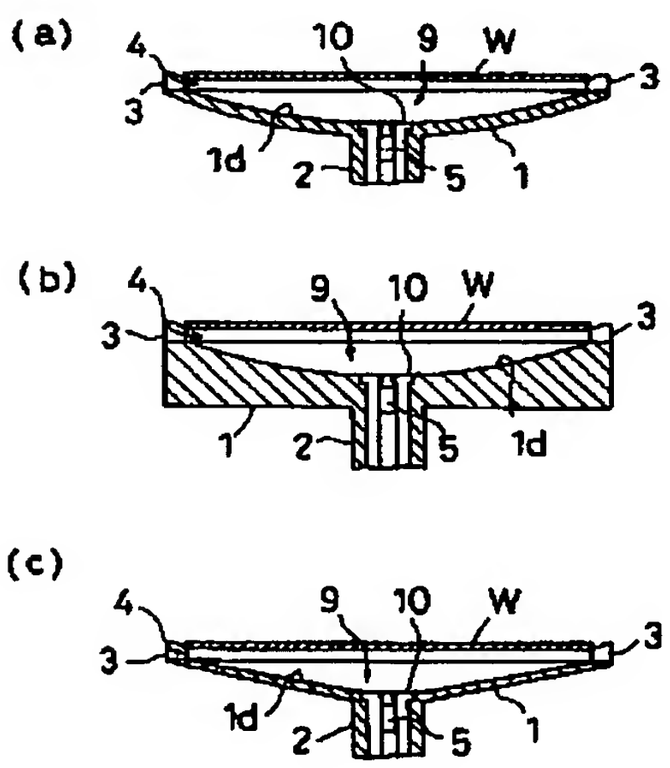
【図１】



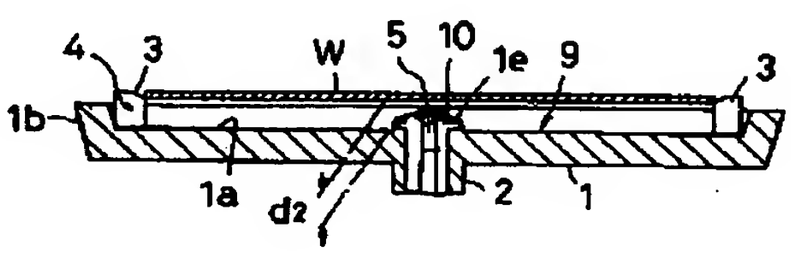
【図２】



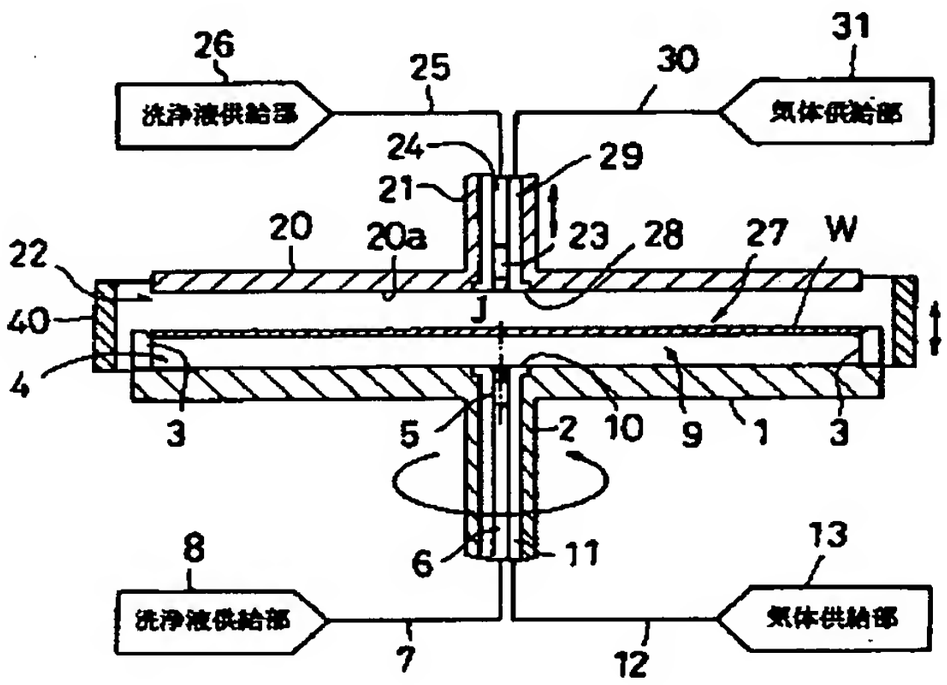
【図３】



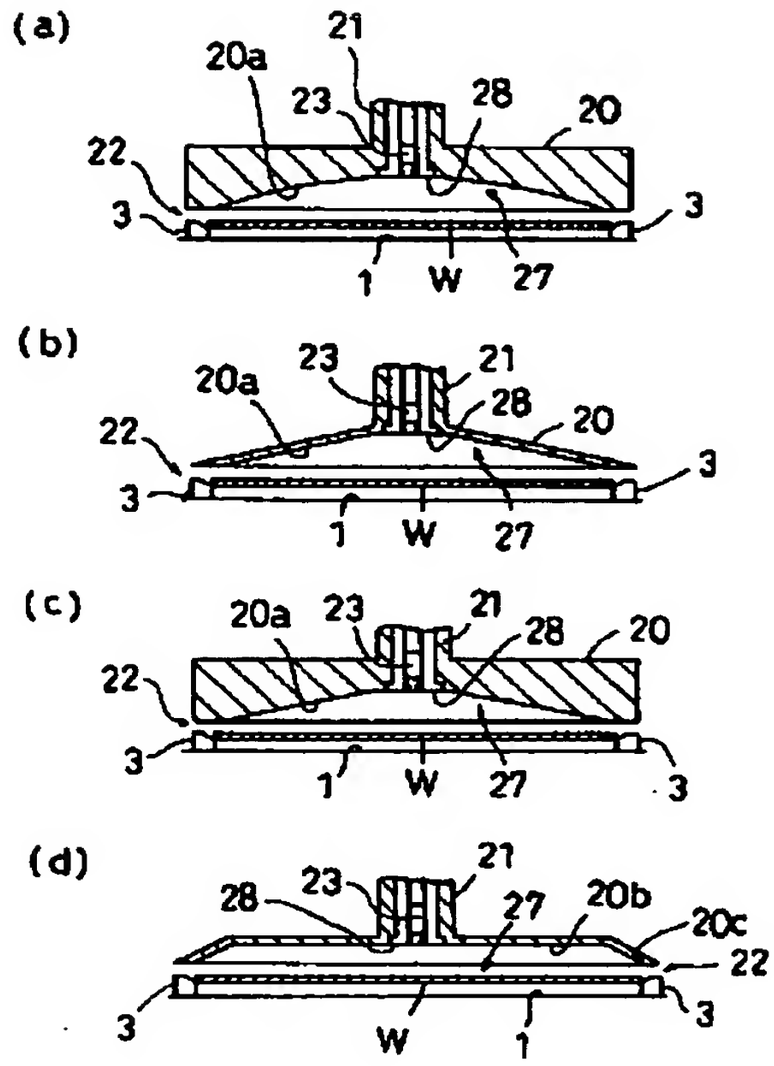
【図４】



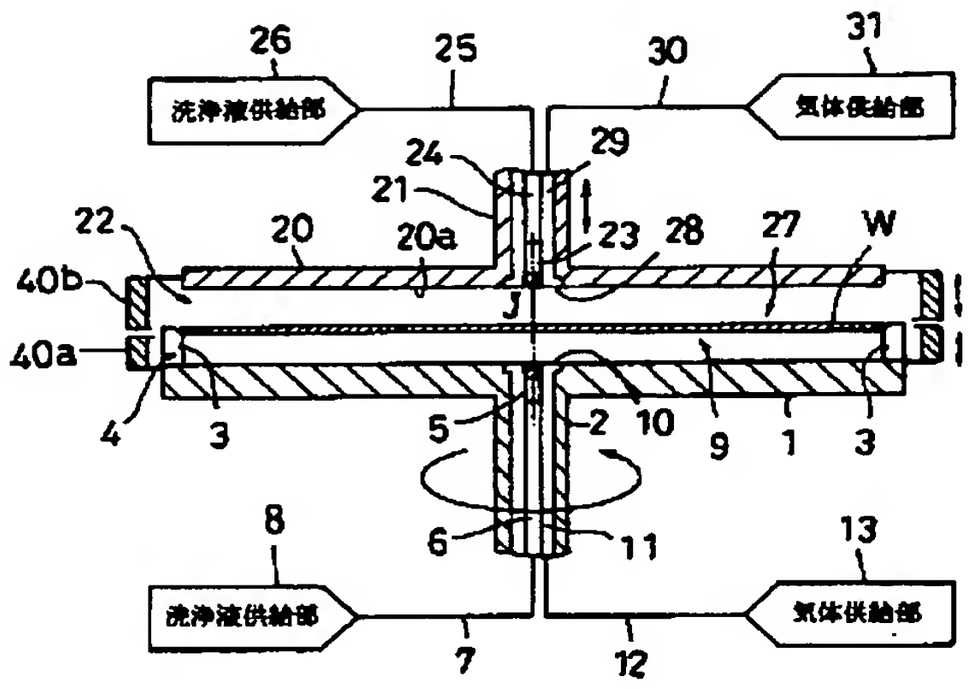
【図６】



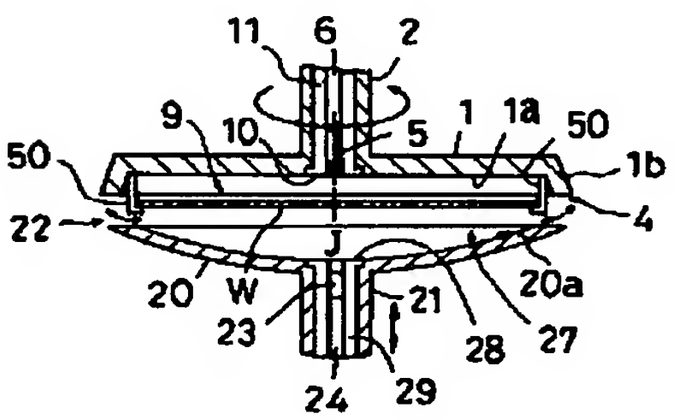
【図５】



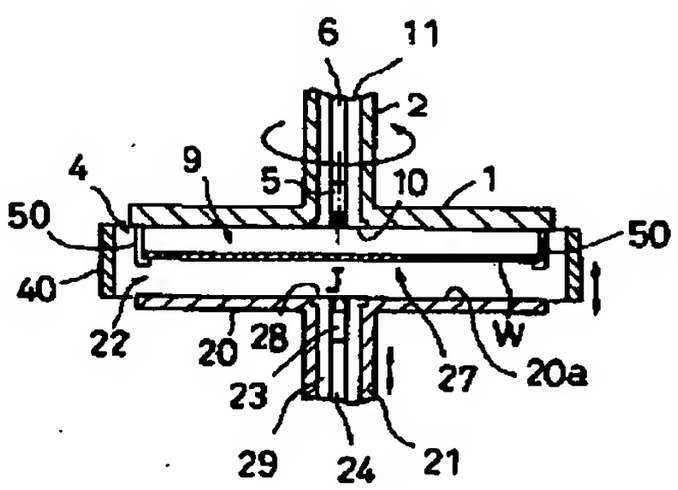
【図７】



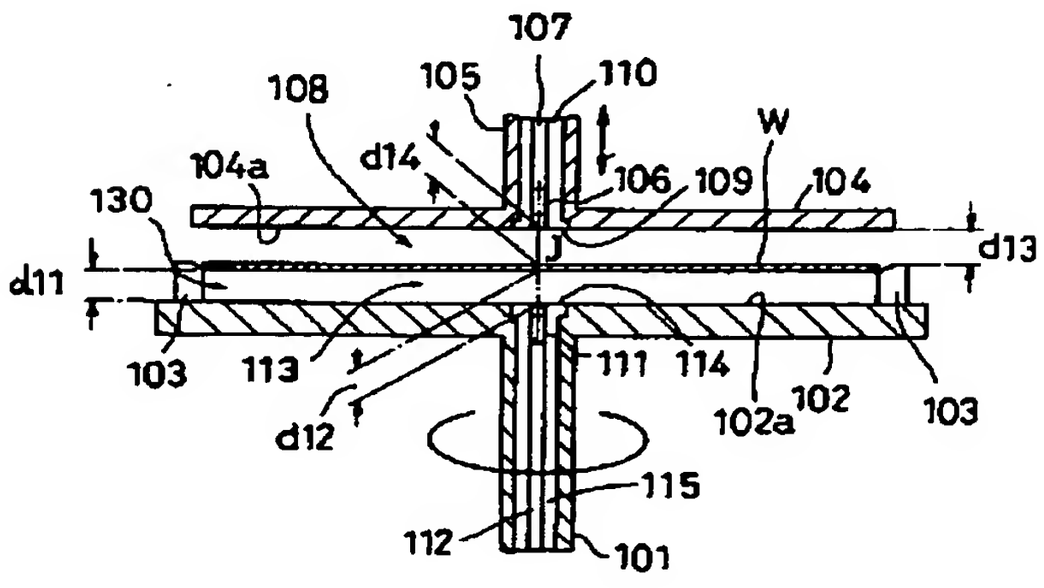
【図８】



【図９】



【図１０】



PATENT ABSTRACTS OF JAPAN

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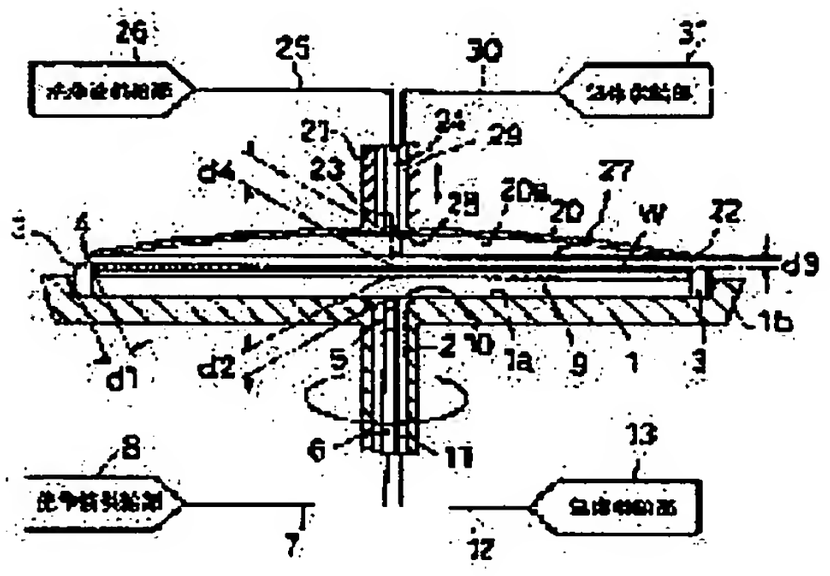
FUKATSU EIJI

(54) SUBSTRATE PROCESSING DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To reduce the amount of use of gas supplied to a spin-base-side space, by making the interval between the outside periphery and part of a substrate held by a substrate holding member and the spin-base narrower than that between the vicinity of the center part of the surface on the spin-base side of the substrate and the counter-surface of the spin-base facing that part.
SOLUTION: A substrate W is, an outer periphery end part is held with a substrate holding member 3 by there or more points, held in horizontal state, away from a spin-base 1. A folding part (folding angle θ: 0° <θ≤ 90°) 1b is configured so that the interval d1 of the gap (spin-base-side gap) 4 between outer-periphery end part of the substrate W held with the substrate holding member 3 and the spin-base 1 is narrower than that (spin-base-side center part interval) d2, (d1<d2), between the center part district of the lower surface on the side of spin-base 1 of the substrate W held with the substrate holding member 3 and the counter-surface of the spin-base 1 facing that part. Thereby, the flow-out amount of gas from the spin-base side pap 4 is less.



LEGAL STATUS

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[Date of sending the examiner's decision of rejection]	
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[Date of registration]	31.10.2003
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[Date of extinction of right]	

CLAIMS

[Claim(s)]
[Claim 1] The spin base which rotates to the circumference of a predetermined shaft and has a substrate and the opposed face which counters, The substrate attachment component which is prepared in said spin base, separates from the opposed face of said spin base, and holds a substrate, A gas supply means to supply a gas to the space between the field by the side of the spin base of the substrate held at said substrate attachment component, and the opposed face of said spin base from near the center-of-rotation section of the opposed face of said spin base, Spacing of the clearance between the periphery edge of the substrate held at the preparation and said substrate attachment component, and said spin base The substrate processor characterized by constituting so that it may be made narrower than spacing of near the center section of the field by the side of said spin base of the substrate held at said substrate attachment component, and the opposed face of said spin base which counters the part.
[Claim 2] The substrate processor characterized by the thing which was turned up in the substrate processor according to claim 1 at the substrate side held at said substrate attachment component at the periphery section of said spin base, and which were equipped with the section by return.
[Claim 3] The substrate processor characterized by the clinch include angle theta of said clinch section being 0 degree < theta<=90 degrees in a substrate processor according to claim 2.
[Claim 4] The substrate processor characterized by having the shape of a concave surface to which the configuration of the opposed face of said spin base curved in a substrate processor according to claim 1.
[Claim 5] The spin base which rotates to the circumference of a predetermined shaft and has a substrate and the opposed face which counters, The substrate attachment component which is prepared in said spin base, separates from the opposed face of said spin base, and holds a substrate, A gas supply means to supply a gas to the space between the field by the side of the spin base of the substrate held at said substrate attachment component, and the opposed face of said spin base from near the center-of-rotation section of the opposed face of said spin base, The substrate processor characterized by having the resistance member which bars the flow of the gas which flows out of the clearance between the periphery edge of the substrate which was formed in the periphery section of said spin base, or its near, and was held at said substrate attachment component, and said spin base.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] It rotates to the circumference of a predetermined shaft, and this invention relates to the substrate processor which supplies gases, such as inert gas and a dried air, to the space between a substrate, the opposed face of the spin base which has the opposed face which counters, and the field by the side of the spin base of the substrate held at the substrate attachment component from near the center-of-rotation section of the opposed face of the spin base.
[0002]
[Description of the Prior Art] This conventional kind of substrate processor is constituted as shown in drawing 10 . The disc-like spin base 102 which has level opposed face 102a which counters Substrate W is connected with the upper limit section of the revolving shaft 101 which transmission connection of the equipment shown in drawing 10 is carried out at the motor which is not illustrated, and rotates to the circumference of Shaft J in one, and three or more substrate attachment components 103 are formed near the periphery section of the spin base 102. A periphery edge is held by three or more places at the substrate attachment component 103, and Substrate W is in the condition which is separated from opposed face 102a of the spin base 102, and it is held by the horizontal position so that it may see from a transverse plane and the inferior surface of tongue by the side of the spin base 102 of Substrate W and opposed face 102a of the spin base 102 may become parallel.
[0003] The disc-like ambient atmosphere cutoff member 104 which has opposed face 104a which counters above the substrate W held at the substrate attachment component 103 in parallel with the top face (this equipment front face) of Substrate W is arranged. If this ambient atmosphere cutoff member 104 is constituted free [rise and fall] through the arm 105 and Substrate W is held at the substrate attachment component 103, as the ambient atmosphere cutoff member 104 descends and it is shown in drawing, contiguity arrangement of the opposed face 104a of the ambient atmosphere cutoff member 104 will be carried out on the top face of the held substrate W.
[0004] The nozzle 106 which supplies a penetrant remover to the top face of the substrate W held at the substrate attachment component 103 is formed in the core of this ambient atmosphere cutoff member 104. A penetrant remover is supplied to this nozzle 106 through the penetrant remover supply pipe 107. Moreover, the gas feed hopper 109 which supplies pure gases, such as inert gas and a dried air, to the ambient atmosphere cutoff member side space 108 between the top face by the side of the ambient atmosphere cutoff member 104 of the substrate W held at the substrate attachment component 103 and opposed face 104a of the ambient atmosphere cutoff member 104 is formed in the perimeter of a nozzle 106. A gas is supplied to this gas feed hopper 109 through the gas supply way 110.
[0005] Moreover, the nozzle 111 which supplies a penetrant remover to the inferior surface of tongue by the side of the spin base 102 of the substrate W held at the substrate attachment component 103 (this equipment rear face) is formed in the core of the spin base 102. A penetrant remover is supplied to this nozzle 111 through the penetrant remover supply pipe 112 installed inside by the revolving shaft 101. Furthermore, the gas feed hopper 114 which supplies a gas to the spin base side space 113 between the inferior surfaces of tongue of Substrate W and opposed face 102a of the spin base 102 which were held at the substrate attachment component 103 is formed in the perimeter of a nozzle 111. A gas is supplied to this gas feed hopper 114 through the gas supply way 115 installed inside the penetrant remover supply pipe 112 and the same axle by the revolving shaft 101.
[0006] Washing / desiccation processing by the above-mentioned equipment is performed as follows. First, if

Substrate W is held at the substrate attachment component 103, the ambient atmosphere cutoff member 104 will descend. Next, the substrate W which was made to rotate a revolving shaft 101 and was held is rotated to the circumference of Shaft J, a penetrant remover is supplied to the top face and inferior surface of tongue of Substrate W from a nozzle 106 and a nozzle 111, and washing to both sides of Substrate W is performed. When a penetrant remover is a drug solution with an etching operation of a hydrofluoric acid etc. at this time, in order to control that the natural oxidation film grows up to be the front face (top face of drawing) of Substrate W, inert gas is supplied to the ambient atmosphere cutoff member side space 108 from the gas feed hopper 109, the ambient atmosphere cutoff member side space 108 is permuted and maintained by the inert gas ambient atmosphere, and washing processing is performed.

[0007] After washing processing is completed, while suspending supply of the penetrant remover from nozzles 106 and 111, rotation of Substrate W is continued, and the penetrant remover adhering to Substrate W is shaken off, and it is made to dry. In order to promote desiccation of the top face of Substrate W, and an inferior surface of tongue in the case of this desiccation, while supplying a gas to the ambient atmosphere cutoff member side space 108 from the gas feed hopper 109, he is trying to supply a gas to the spin base side space 113 from the gas feed hopper 114.

[0008]

[Problem(s) to be Solved by the Invention] However, in the case of the conventional example which has such a configuration, there are the following problems. In equipment, conventionally the gas supplied to the spin base side space 113 from the gas feed hopper 114, rotating the spin base 102 and Substrate W It flows in the direction of a periphery edge from the core of the field by the side of the spin base 102 of the substrate W held at the substrate attachment component 103. It will flow out of the clearance 130 between the periphery edges of Substrate W and the spin bases 102 which were held at the substrate attachment component 103 (this clearance is also hereafter called "spin base side clearance") outside. In order to promote desiccation of the field by the side of the spin base 102 of Substrate W, a gas needs to be filled in the spin base side space 113 so that a gas may touch all over the field of Substrate W. Therefore, conventionally, with the configuration of equipment, carrying out sequential supply of the new gas had to be continued from the gas feed hopper 114 so that the gas which flows out of the spin base side clearance 130 may be compensated, and the amount of the gas used supplied to the spin base side space 113 had increased.

[0009] Moreover, conventionally which is shown in drawing 10 , in equipment, an external ambient atmosphere may flow into the spin base side space 113 from the spin base side clearance 130, and the field by the side of the spin base 1 of Substrate W might be polluted.

[0010] This invention is made in view of such a situation, and it aims at offering the substrate processor which can mitigate contamination of the field by the side of the spin base of a substrate while it reduces the amount of the gas used supplied to spin base side space.

[0011]

[Means for Solving the Problem] This invention takes the following configurations, in order to attain such a purpose. Namely, the spin base which invention according to claim 1 rotates to the circumference of a predetermined shaft, and has a substrate and the opposed face which counters, The substrate attachment component which is prepared in said spin base, separates from the opposed face of said spin base, and holds a substrate, A gas supply means to supply a gas to the space between the field by the side of the spin base of the substrate held at said substrate attachment component, and the opposed face of said spin base from near the center-of-rotation section of the opposed face of said spin base, Spacing of the clearance between the periphery edge of the substrate held at the preparation and said substrate attachment component, and said spin base It is characterized by constituting so that it may be made narrower than spacing of near the center section of the field by the side of said spin base of the substrate held at said substrate attachment component, and the opposed face of said spin base which counters the part.

[0012] Invention according to claim 2 is characterized by the thing which was turned up at the substrate side held at said substrate attachment component at the periphery section of said spin base and which were equipped with the section by return in a substrate processor according to claim 1.

[0013] Invention according to claim 3 is characterized by the clinch include angle theta of said clinch section being 0 degree < theta<=90 degrees in a substrate processor according to claim 2.

[0014] Invention according to claim 4 is characterized by having the shape of a concave surface to which the configuration of the opposed face of said spin base curved in a substrate processor according to claim 1.

[0015] The spin base which invention according to claim 5 rotates to the circumference of a predetermined

shaft, and has a substrate and the opposed face which counters, The substrate attachment component which is prepared in said spin base, separates from the opposed face of said spin base, and holds a substrate, A gas supply means to supply a gas to the space between the field by the side of the spin base of the substrate held at said substrate attachment component, and the opposed face of said spin base from near the center-of-rotation section of the opposed face of said spin base, It is prepared in the periphery section of said spin base, or its near, and is characterized by having the resistance member which bars the flow of the gas which flows out of the clearance between the periphery edge of the substrate held at said substrate attachment component, and said spin base.

[0016]

[Function] The operation of invention according to claim 1 is as follows. While a substrate is held at a substrate attachment component, the spin base rotates to the circumference of a predetermined shaft and the spin base and a substrate rotate to the circumference of the shaft, with a gas supply means If a gas is supplied to the space between the field by the side of the spin base of the substrate held at the substrate attachment component, and the opposed face of the spin base from near the center-of-rotation section of the opposed face of the spin base, a gas will flow to a periphery edge from the core of the field by the side of the spin base of the substrate held at the substrate attachment component.

[0017] The clearance between the periphery edges of a substrate and the spin bases which were held in this invention according to claim 1 at the substrate attachment component Spacing with the opposed face of the spin base where spacing of (this clearance is also hereafter called "spin base side clearance") counters near a center section and the part of the field by the side of the spin base of the substrate held at the substrate attachment component Since it constitutes so that it may become narrower than (this spacing is also hereafter called "spin base side center-section spacing") Spacing of a spin base side clearance and spin base side center-section spacing compare with equipment conventionally [same]. The gas which flows to a periphery edge from the core of the field by the side of the spin base of the substrate held at the substrate attachment component stops easily being able to flow out of a spin base side clearance, and the flow of the gas from a spin base side clearance decreases. Therefore, in order to fill the gas to the above-mentioned space, the amount of supply of the gas which newly continues carrying out sequential supply from a gas supply means becomes less than equipment conventionally.

[0018] Moreover, since spacing of a spin base side clearance is narrower than spin base side center-section spacing, compared with equipment, an external ambient atmosphere stops easily being able to flow into the above-mentioned space from a spin base side clearance conventionally [with same spacing of a spin base side clearance and spin base side center-section spacing].

[0019] The operation of invention according to claim 2 is as follows. That is, since it has the section by return, the gas which was turned up at the substrate side held at the substrate attachment component at the periphery section of the spin base and which is going to flow into this clinch section hits, and the flow of the gas from a spin base side clearance decreases further.

[0020] The operation of invention according to claim 3 is as follows. That is, since the clinch include angle theta of the clinch section is 0 degree < theta<=90 degrees, after the gas which is going to flow into this clinch section hits, with an outflow, a gas will flow to hard flow, a gas stops easily being able to flow out of a spin base side clearance into being carried out, and the flow of the gas from a spin base side clearance decreases further.

[0021] The operation of invention according to claim 4 is as follows. That is, since it has the shape of a concave surface to which the configuration of the opposed face of the spin base curved, the gas supplied from near the center-of-rotation section of the opposed face of the spin base by the gas supply means spreads round the above-mentioned whole space according to the shape of a curved concave surface.

[0022] The operation of invention according to claim 5 is as follows. While the substrate and the spin base which were held at the substrate attachment component rotate to the circumference of a predetermined shaft, namely, with a gas supply means The gas supplied to the space between the field by the side of the spin base of the substrate held at the substrate attachment component, and the opposed face of the spin base from near the center-of-rotation section of the opposed face of the spin base Although it is going to flow to a periphery edge from the core of the field by the side of the spin base of the substrate held at the substrate attachment component and is going to flow out of a spin base side clearance, the flow of this gas is barred by the resistance member prepared in the periphery section of the spin base, or its near. Therefore, since a gas stops easily being able to flow out of a spin base side clearance and the flow of the gas from a spin base side clearance becomes less than equipment conventionally, in order to fill the gas to the above-mentioned space, the amount of supply

of the gas which newly continues carrying out sequential supply from a gas supply means becomes less than equipment conventionally.
[0023] Moreover, since the resistance member is prepared in the periphery section of the spin base, or its near, the external ambient atmosphere which is going to flow into the above-mentioned space from a spin base side clearance is obstructed by the resistance member. Therefore, compared with equipment, an external ambient atmosphere stops being able to flow into the above-mentioned space easily conventionally.
[0024] In addition, a resistance member may be constituted in the spin base and one by turning up the periphery section of for example, the spin base to the periphery edge side of the substrate held at the substrate attachment component etc., and may consist of the spin base and an another member.
[0025]
[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with reference to a drawing. Drawing 1 is drawing of longitudinal section showing the configuration of the substrate processor concerning the 1st example of this invention.
[0026] The spin base 1 is connected with the upper limit section of the revolving shaft 2 which transmission connection is carried out at the motor which is not illustrated, and rotates to the circumference of Shaft J in one, and is constituted pivotable at the circumference of Shaft J. Three or more substrate attachment components 3 for holding the periphery edge of Substrate W by three or more places are formed in this spin base 1.
[0027] A periphery edge is held by three or more places at these substrates attachment component 3, and Substrate W is held by the horizontal position in the condition of having separated from the spin base 1.
[0028] The spin base 1 is equipped with clinch section 1b by which the perimeter (periphery section of the spin base 1) of horizontal level 1a which has the horizontal plane which counters Substrate W, and horizontal level 1a was turned up at the periphery edge side of the substrate W held at the substrate attachment component 3. By return [a / this / horizontal level 1], section 1b may be constituted from a member of one, and it may consist of another members so that section 1b may be attached in the perimeter of disc-like horizontal level 1a by return.
[0029] Moreover, the clearance between the periphery edges of Substrate W and the spin bases 1 which were held at the substrate attachment component 3 (This clearance is also hereafter called "spin base side clearance") The spacing d1 of 4 Near the center section of the inferior surface of tongue by the side of the spin base 1 of the substrate W held at the substrate attachment component 3 narrower (d1<d2) than the spacing (this spacing is also hereafter called "spin base side center-section spacing") d2 of (for example, a core) and the opposed face (this example horizontal plane of horizontal level 1a) of the spin base 1 which counters that part — said clinch section 1b is constituted like.
[0030] The nozzle 5 which supplies a penetrant remover to the inferior surface of tongue by the side of the spin base 1 of the substrate W held at the substrate attachment component 3 (it usually becomes a rear face with the equipment which holds Substrate W like this example equipment in the upper part of the spin base 1) is formed in the core of the spin base 1. A penetrant remover is supplied to this nozzle 5 from the penetrant remover feed zone 8 through the penetrant remover supply pipe 6, tubing 7, etc. which were installed inside by the revolving shaft 2.
[0031] Moreover, the gas feed hopper 10 which supplies gases, such as inert gas (nitrogen gas etc.) and a dried air, to the spin base side space 9 between the inferior surface of tongue by the side of the spin base 1 of the substrate W held at the substrate attachment component 3 and the opposed face of the spin base 1 is formed in the perimeter of a nozzle 5. A gas is supplied to this gas feed hopper 10 from the gas feed zone 13 through the penetrant remover supply pipe 6, the gas supply way 11, tubing 12 which were installed inside the same axle by the revolving shaft 2, etc.
[0032] The ambient atmosphere cutoff member 20 is formed above the substrate W held at the substrate attachment component 3. This ambient atmosphere cutoff member 20 is connected with the arm 21, and it is constituted possible [rise and fall] so that it may attach and detach to the substrate W with which the ambient atmosphere cutoff member 20 was held by the elevator style which is not illustrated through this arm 21 at the substrate attachment component 3.
[0033] Opposed face 20a of the ambient atmosphere cutoff member 20 which counters the top face by the side of the ambient atmosphere cutoff member 20 of the substrate W held at the substrate attachment component 3 (it usually becomes a front face with the equipment which holds Substrate W like this example equipment in the upper part of the spin base 1) is constituted in the shape of [which saw and curved from the top face of the substrate W held at the substrate attachment component 3] a concave surface. The clearance between the

periphery edges of Substrate W and opposed face 20a of the ambient atmosphere cutoff member 20 which were held by this at the substrate attachment component 3 (This clearance is also hereafter called "ambient atmosphere cutoff member side clearance") The spacing d3 of 22 narrower (d3<d4) than the spacing (this spacing is also hereafter called "ambient atmosphere cutoff member side center-section spacing") d4 of near the center section of the top face of the substrate W held at the substrate attachment component 3 (for example, core), and opposed face 20a of the ambient atmosphere cutoff member 20 which counters that part — it constitutes like.

[0034] The nozzle 23 which supplies a penetrant remover to the top face of the substrate W held at the substrate attachment component 3 is formed in the core of the ambient atmosphere cutoff member 20. A penetrant remover is supplied to this nozzle 23 from the penetrant remover feed zone 26 through the penetrant remover supply pipe 24, tubing 25, etc. which were installed inside by the arm 21.

[0035] Moreover, the gas feed hopper 28 which supplies gases, such as inert gas and a dried air, to the ambient atmosphere cutoff member side space 27 between the top face by the side of the ambient atmosphere cutoff member 20 of the substrate W held at the substrate attachment component 3 and opposed face 20a of the ambient atmosphere cutoff member 20 is formed in the perimeter of a nozzle 23. A gas is supplied to this gas feed hopper 28 from the gas feed zone 31 through the penetrant remover supply pipe 24, the gas supply way 29, tubing 30 which were installed inside the same axle by the arm 21, etc.

[0036] Washing / desiccation processing by the above-mentioned 1st example equipment is performed as follows. First, if Substrate W is held at the substrate attachment component 3, the ambient atmosphere cutoff member 20 will descend, and as shown in drawing 1 R> 1, contiguity arrangement of the ambient atmosphere cutoff member 20 will be carried out at the substrate W held at the substrate attachment component 3.

[0037] Next, the substrate W which was made to rotate a revolving shaft 2 and was held is rotated to the circumference of Shaft J with the spin base 1, a penetrant remover is supplied to the inferior surface of tongue and top face of Substrate W from a nozzle 5 and a nozzle 23, and washing to both sides of Substrate W is performed. In being the drug solution with which a penetrant remover has an etching operation of a hydrofluoric acid etc. at this time, in order to control that the natural oxidation film grows up to be the front face (top face of drawing) of Substrate W, inert gas is supplied to the ambient atmosphere cutoff member side space 27 from the gas feed hopper 28, the ambient atmosphere cutoff member side space 27 is permuted and maintained by the inert gas ambient atmosphere, and washing processing is performed.

[0038] After washing processing is completed, while suspending supply of the penetrant remover from nozzles 5 and 23, rotation of Substrate W is continued, and the penetrant remover adhering to Substrate W is shaken off, and it is made to dry. In order to promote desiccation of the top face of Substrate W, and an inferior surface of tongue in the case of this desiccation, while supplying a gas to the ambient atmosphere cutoff member side space 27 from the gas feed hopper 28, a gas is supplied to the spin base side space 9 from the gas feed hopper 10.

[0039] When a gas is supplied to the spin base side space 9 for promotion of desiccation of the inferior surface of tongue (rear face) of Substrate W etc., now, with this 1st example equipment Since the spacing d1 of the spin base side clearance 4 is constituted so that it may be made narrower than the spin base side center-section spacing d2 as shown in drawing 1 As shown in drawing 1010 , it compares with equipment conventionally the spacing d11 of the spin base side clearance 130 and whose spin base side center-section spacing d12 are the same (d11=d12). The gas which flowed to the periphery edge from the core of the field by the side of the spin base 1 of the substrate W held at the substrate attachment component 3 stops easily being able to flow out of the spin base side clearance 4, and the flow of the gas from the spin base side clearance 4 decreases.

[0040] Moreover, since the flow of the gas which is going to flow out of the spin base side clearance 4 is barred by the medial surface (field by the side of the spin base side space 9) of clinch section 1b of the periphery section of the spin base 1, also by that, a gas stops further easily being able to flow out of the spin base side clearance 4, and the flow of the gas from the spin base side clearance 4 becomes less than equipment conventionally.

[0041] Therefore, in order to fill the gas to the spin base side space 9, the amount of supply of the gas which newly continues carrying out sequential supply from the gas feed hopper 10 can be made conventionally fewer than equipment, and the amount of the gas used supplied to the spin base side space 9 can be reduced.

[0042] Moreover, since the spacing d1 of the spin base side clearance 4 is narrower than the spin base side center-section spacing d2, compared with equipment, an external ambient atmosphere stops easily being able to flow into the spin base side space 9 from the spin base side clearance 4 conventionally [with same spacing d11

of the spin base side clearance 130 and spin base side center-section spacing d12].
[0043] Furthermore, since the external ambient atmosphere which is going to flow into the spin base side space 9 also becomes obstructed by clinch section 1b of the periphery section of the spin base 1 from the spin base side clearance 4, compared with equipment, an external ambient atmosphere stops easily being able to flow into the spin base side space 9 also due to that conventionally.
[0044] Therefore, contamination of the inferior surface of tongue by the side of the spin base 1 of Substrate W is conventionally mitigable from equipment.
[0045] In addition, to the spin base side center-section spacing d2 being 10mm, when spacing d1 of the spin base side clearance 4 was set to 1mm, that high effectiveness was acquired has checked experimentally.
[0046] Moreover, since it constitutes from the 1st example of the above so that spacing d3 of the ambient atmosphere cutoff member side clearance 22 may be made narrower than the ambient atmosphere cutoff member side center-section spacing d4 as shown in drawing 1 For control of growth of the natural oxidation film of the top face (front face) of Substrate W, promotion of desiccation, etc. As well as the relation between Substrate W and the spin base 1 when supplying a gas to the ambient atmosphere cutoff member side space 27 The spacing d13 of the ambient atmosphere cutoff member side clearance 22 and the ambient atmosphere cutoff member side center-section spacing d14 compare with equipment (refer to drawing 10) conventionally [same]. The gas which flowed to the periphery edge from the core of the field by the side of the ambient atmosphere cutoff member 20 of the substrate W held at the substrate attachment component 3 stops easily being able to flow out of the ambient atmosphere cutoff member side clearance 22. In order for the flow of the gas from the ambient atmosphere cutoff member side clearance 22 to decrease and to fill the gas to the ambient atmosphere cutoff member side space 27, the amount of supply of the gas which newly continues carrying out sequential supply can be made conventionally fewer than equipment from the gas feed hopper 28. The amount of the gas used supplied to the ambient atmosphere cutoff member side space 27 can be reduced.
[0047] Moreover, since the spacing d3 of the ambient atmosphere cutoff member side clearance 22 is narrower than the ambient atmosphere cutoff member side center-section spacing d4, an external ambient atmosphere stops easily being able to flow into the ambient atmosphere cutoff member side space 27 from the ambient atmosphere cutoff member side clearance 22, and contamination of the top face by the side of the ambient atmosphere cutoff member 20 of Substrate W can be conventionally mitigated from equipment.
[0048] Next, some modifications for making spacing d1 of the spin base side clearance 4 narrower than the spin base side center-section spacing d2 are introduced.
[0049] You may make it turn up clinch section 1b of the spin base 1 from the location by the side of the core of the spin base 1 from the apparent vertical VL passing through the periphery edge of the substrate W held at the substrate attachment component 3, as shown in drawing 2 (a).
[0050] Moreover, with an outflow, if the clinch include angle theta of clinch section 1b of the spin base 1 is made into 0 degree < theta<=90 degrees as shown in drawing 2 (b) and (c), after the gas which is going to flow into this clinch section 1b will hit, since a gas flows to hard flow, the gas from the spin base side clearance 4 stops being able to flow out easily, and the flow of the gas from the spin base side clearance 4 decreases further.
[0051] Furthermore, as shown in drawing 2 (d), upper limit 1c of the periphery section (periphery section of clinch section 1b) of the spin base 1 may constitute so that it may consist of a horizontal plane HP including the inferior surface of tongue of the substrate W held at the substrate attachment component 3 caudad, and it may constitute so that it may become the upper part to the same extent or a little.
[0052] Moreover, if 1d of opposed faces of the spin base 1 which counters the inferior surface of tongue of the substrate W held at the substrate attachment component 3 is made into the shape of a concave surface which saw and curved from the inferior surface of tongue of Substrate W like opposed face 20a of the ambient atmosphere cutoff member 1 as shown in drawing 3 (a) and (b), the gas supplied from near the center-of-rotation section of the opposed face of the spin base 1 will come to spread round the spin base side space 9 whole. In addition, in drawing 3 (a), it is what constituted the spin base 1 from a dished member, and drawing 3 (b) prepares a crevice so that 1d of opposed faces of the above-mentioned configuration may be formed in the cylinder-like spin base 1.
[0053] Moreover, although 1d of opposed faces of the spin base 1 was incurvated, as shown in drawing 3 (c) and (d), a part for the bend may consist of drawing 3 (a) and (b) in a straight-line-like inclined plane.
[0054] In addition, as shown in drawing 4 , when you prepare heights 1e near the core of the spin base 1 and the nozzle 5 and the gas feed hopper 10 are provided in this heights 1e, let spin base side center-section spacing d2 be spacing around that heights 1e.

[0055] Moreover, in order to make spacing d1 of the spin base side clearance 4 narrower than the spin base side center-section spacing d2, it cannot be overemphasized that the configuration of those other than the 1st example of the above or its modification is also realizable.
[0056] Next, some modifications for making spacing d3 of the ambient atmosphere cutoff member side clearance 22 narrower than the cutoff member side center-section spacing d4 are introduced.
[0057] Although the ambient atmosphere cutoff member 20 was constituted from a dished member, as shown in drawing 5 (a), a crevice may prepare and consist of the 1st example of the above so that opposed face 20a of the shape of a concave surface which curved to the cylinder-like ambient atmosphere cutoff member 20 may be formed.
[0058] Moreover, a part for the bend of opposed face 20a of the ambient atmosphere cutoff member 20 of the 1st example of the above or the ambient atmosphere cutoff member 20 of the modification of drawing 5 (a) may consist of straight-line-like inclined planes, as shown in drawing 5 (b) and (c).
[0059] Furthermore, as shown in drawing 5 (d), section 20c may be had and constituted like the spin base 1 of the 1st example of the above by return [member / 20 / ambient atmosphere cutoff / b / horizontal level 20]. In addition, about clinch section 20c of the ambient atmosphere cutoff member 20 constituted in this way, deformation implementation may be carried out like the modification stated by drawing 2 about clinch section 1b of the spin base 1.
[0060] Moreover, in order to make spacing d3 of the ambient atmosphere cutoff member side clearance 22 narrower than the ambient atmosphere cutoff member side center-section spacing d4, it cannot be overemphasized that the configuration of those other than the 1st example of the above or its modification is also realizable.
[0061] A substrate processor may be constituted combining suitably the 1st example of the above or drawing 2 , the spin base 1 of the arbitration of each modification of drawing 3 , and the ambient atmosphere cutoff member 20 of the arbitration of the 1st example of the above, or each modification of drawing 5 R> 5.
[0062] Next, the configuration of the 2nd example equipment of this invention is explained with reference to drawing 6 R> 6. This 2nd example equipment is characterized by to form the resistance member 40 which bars the flow of the gas into which the gas supplied to the ambient atmosphere cutoff member side space 27 flows out of the ambient atmosphere cutoff member side clearance 22 near the periphery section of the ambient atmosphere cutoff member 20 near the periphery section of the spin base 1 while the gas supplied to the spin base side space 9 bars the flow of the gas which flows out of the spin base side clearance 4.
[0063] This resistance member 40 consists of ring-like members, and is constituted free [rise and fall] to the spin base 1 by the elevator style which is not illustrated. In addition, you may constitute so that rise and fall of the resistance member 40 may carry out independently with the ambient atmosphere cutoff member 20, the resistance member 40 may be connected with the ambient atmosphere cutoff member 20, and you may constitute so that you may make it go up and down with the ambient atmosphere cutoff member 20. In addition, the part which is common in the 1st example attaches the same sign as drawing 1 , and the detailed explanation is omitted.
[0064] Since the flow of the gas which is supplied to the spin base side space 9, flows to a periphery edge from the core of the field by the side of the spin base 1 of the substrate W held at the substrate attachment component 3, and flows out of the spin base side clearance 4 by having formed such a resistance member 40 is barred by this resistance member 40, a gas stops easily being able to flow out of the spin base side clearance 4. Therefore, the amount of the gas used which the amount of supply of the gas which newly [as shown in drawing 6 , even if it is making the spin base 1 the conventionally same configuration as equipment (refer to drawing 10), in order that the flow of the gas from the spin base side clearance 4 may fulfill air to the spin base side space 9 in ** rather than equipment conventionally] from the gas feed hopper 10 continues carrying out sequential supply can be made conventionally fewer than equipment, and is supplied to the spin base side space 9 can be reduced.
[0065] Moreover, since the external ambient atmosphere which is going to flow into the spin base side space 9 from the spin base side clearance 4 is obstructed by the resistance member 40, compared with equipment, an external ambient atmosphere stops easily being able to flow into the spin base side space 9, and it can mitigate contamination of the inferior surface of tongue by the side of the spin base 1 of Substrate W from equipment conventionally.
[0066] Moreover, the ambient atmosphere cutoff member side space 27 is supplied, and it flows to a periphery edge from the core of the field by the side of the ambient atmosphere cutoff member 20 of the substrate W held

at the substrate attachment component 3, and since the flow of the gas which flows out of the ambient atmosphere cutoff member side clearance 22 is also barred by the resistance member 40, a gas stops easily being able to flow out of the ambient atmosphere cutoff member side clearance 22. Therefore, as shown in drawing 6 , even if it is making the ambient atmosphere cutoff member 20 conventionally the same configuration as equipment (refer to drawing 10) The flow of the gas from the ambient atmosphere cutoff member side clearance 22 becomes less than equipment conventionally. In order to fulfill air to the ambient atmosphere cutoff member side space 27, the amount of supply of the gas which newly continues carrying out sequential supply from the gas feed hopper 28 can be made conventionally fewer than equipment, and the amount of the gas used supplied to the ambient atmosphere cutoff member side space 27 can be reduced.

[0067] Moreover, since the external ambient atmosphere which is going to flow into the ambient atmosphere cutoff member side space 27 from the ambient atmosphere cutoff member side clearance 22 is obstructed by the resistance member 40, compared with equipment, an external ambient atmosphere stops easily being able to flow into the ambient atmosphere cutoff member side space 27, and it can mitigate contamination of the top face by the side of the ambient atmosphere cutoff member 20 of Substrate W from equipment conventionally.

[0068] In addition, the resistance member which bars the flow of the gas into which the gas supplied to the spin base side space 9 flows out of the spin base side clearance 4 with the above-mentioned 2nd example equipment, Although the gas supplied to the ambient atmosphere cutoff member side space 27 constitutes the resistance member which bars the flow of the gas which flows out of the ambient atmosphere cutoff member side clearance 22 from a member 40 of one Resistance member 40a of the shape of a ring which bars the flow of the gas into which the gas separately supplied to the spin base side space 9 flows these members out of the spin base side clearance 4 as shown in drawing 7 , You may divide and prepare in resistance member 40b of the shape of a ring which bars the flow of the gas into which the gas supplied to the ambient atmosphere cutoff member side space 27 flows out of the ambient atmosphere cutoff member side clearance 22.

[0069] Moreover, resistance member 40a may be prepared in the periphery section of the spin base 1 like clinch section 1b of the spin base 1 of the 1st example equipment, or the spin base 1 of the modification of drawing 2 . Resistance member 40b may be similarly prepared in the periphery section of the ambient atmosphere cutoff member 20.

[0070] In the 2nd example of the above, or its modification, although the resistance member is constituted from a ring-like member, a resistance member may consist of other configurations and a configuration.

[0071] Moreover, since effectiveness, such as reduction of the amount of supply of the gas to the spin base side space 9 or the ambient atmosphere cutoff member side space 27 and mitigation of contamination of both sides of Substrate W, is acquired by having formed the resistance member 40 As shown in drawing 6 , the spin base 1 and the ambient atmosphere cutoff member 20 are the same configuration (spin base side center-section spacing is the same as spacing of a spin base side clearance) as equipment conventionally. Even if ambient atmosphere cutoff member side center-section spacing is the same as spacing of an ambient atmosphere cutoff member side clearance, it is good, but while, constituting the spin base 1 or/and the ambient atmosphere cutoff member 20 like the 1st example equipment or its modification for example, you may constitute so that the resistance member 40 may be formed. Thus, if constituted, still higher effectiveness can be acquired.

[0072] Next, the configuration of the 3rd example equipment of this invention is explained with reference to drawing 8 R> 8. This 3rd example equipment is characterized by constituting so that Substrate W may be held in the lower part of the spin base 1. The substrate attachment component 50 of this equipment is constituted free [closing motion], as the arrow head of drawing shows, and it holds Substrate W so that the periphery edge of Substrate W may be pinched by three or more places. The equipment of such a configuration usually uses the front face of Substrate W as the top face by the side of the spin base 1, and is processed. other configurations — the 1st example of the above, and abbreviation — since it is the same, a common part attaches the same sign as drawing 1 , and omits the detailed explanation.

[0073] Even if it is equipment of such a configuration, the same effectiveness as the 1st example equipment can be acquired. Moreover, each modification explaining the 1st example equipment is applicable also like this 3rd example equipment.

[0074] The 4th example equipment shown in drawing 9 forms the resistance member 40 in the equipment constituted so that Substrate W might be held in the lower part of the spin base 1 like the above-mentioned 3rd example equipment like the above-mentioned 2nd example equipment.

[0075] Also with this 4th example equipment, the same effectiveness as the 2nd example equipment can be acquired. Moreover, each modification explaining the 2nd example equipment is applicable also like this 4th

example equipment.
[0076] In addition, although the creativity which is equipped with the ambient atmosphere cutoff member 20, and aims at reduction of the amount of supply of the gas to the ambient atmosphere cutoff member side space 27 and reduction of contamination of the field by the side of the ambient atmosphere cutoff member 20 of Substrate W is put in each above-mentioned example This invention can be similarly applied to the equipment which is not equipped with the ambient atmosphere cutoff member 20, and can aim at reduction of the amount of supply of the gas to the spin base side space 9, and reduction of contamination of the field by the side of the spin base 1 of Substrate W.
[0077] Moreover, can constitute the ambient atmosphere cutoff member of the above-mentioned 1st and 3rd example equipment from an ambient atmosphere cutoff member of the same configuration as equipment conventionally, or reduction of the amount of supply of the gas to the spin base side space 9 and reduction at least of contamination of the field by the side of the spin base 1 of Substrate W can aim at also in equipment which was made the configuration (the same is said of the 4th example equipment) which excluded the above-mentioned 2nd resistance member 40b.
[0078]
[Effect of the Invention] According to invention according to claim 1, spacing of the clearance between the periphery edges of a substrate and the spin bases which were held at the substrate attachment component (spin base side clearance) so that clearly from the above explanation Since it constituted so that it might be made narrower than spacing (spin base side center-section spacing) of near the center section of the field by the side of the spin base of the substrate held at the substrate attachment component, and the opposed face of the spin base which counters the part Compared with equipment, the flow of the gas from a spin base side clearance becomes less than equipment conventionally conventionally [with same spacing of a spin base side clearance and spin base side center-section spacing]. Therefore, in order to fill the gas to the space between the field by the side of the spin base of the substrate held at the substrate attachment component, and the opposed face of the spin base, the amount of supply of the gas which newly continues carrying out sequential supply from a gas supply means can be made conventionally fewer than equipment, and the amount of the gas used supplied to the above-mentioned space can be reduced.
[0079] Moreover, since spacing of a spin base side clearance is narrower than spin base side center-section spacing, conventionally [with same spacing of a spin base side clearance and spin base side center-section spacing], compared with equipment, an external ambient atmosphere stops being able to flow into the above-mentioned space easily from a spin base side clearance, and contamination of the field by the side of the spin base of a substrate can be conventionally mitigated from equipment.
[0080] According to invention according to claim 2, since it has the section by return, the gas which was turned up at the substrate side held at the substrate attachment component at the periphery section of the spin base and which is going to flow into this clinch section hits, and the flow of the gas from a spin base side clearance can be lessened further.
[0081] According to invention according to claim 3, since the clinch include angle theta of the clinch section is 0 degree < theta<=90 degrees, after the gas which is going to flow into this clinch section hits, with an outflow, hard flow ****** will flow, and the gas from a spin base side clearance stops being able to flow out further easily, and can lessen further the flow of the gas from a spin base side clearance.
[0082] the gas supplied from near the center-of-rotation section of the opposed face of the spin base by the gas supply means since it had the shape of a concave surface to which the configuration of the opposed face of the spin base curved according to invention according to claim 4 — the above-mentioned space whole — what — it can spread without ****.
[0083] Since the resistance member which bars the flow of the gas into which the gas supplied to the space between the field by the side of the spin base of the substrate held at the substrate attachment component and the opposed face of the spin base flows out of a spin base side clearance was prepared in the periphery section of the spin base, or its near according to invention according to claim 5, the flow of the gas which flows out of a spin base side clearance becomes less than equipment conventionally. Therefore, in order to fill the gas to the above-mentioned space, the amount of supply of the gas which newly continues carrying out sequential supply from a gas supply means can be made conventionally fewer than equipment, and the amount of the gas used supplied to the above-mentioned space can be reduced.
[0084] Moreover, since the resistance member is prepared in the periphery section of the spin base, or its near, it is obstructed by the resistance member, an external ambient atmosphere stops being able to flow into the

above-mentioned space easily compared with equipment conventionally, and the external ambient atmosphere which is going to flow into the above-mentioned space from a spin base side clearance can mitigate contamination of the field by the side of the spin base of a substrate from equipment conventionally.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is drawing of longitudinal section showing the configuration of the substrate processor concerning the 1st example of this invention.
[Drawing 2] It is the fragmentary sectional view showing the configuration of the modification for making spacing of a spin base side clearance narrower than spin base side center-section spacing.
[Drawing 3] It is drawing of longitudinal section showing the configuration of the modification of others for making spacing of a spin base side clearance narrower than spin base side center-section spacing.
[Drawing 4] It is drawing showing spin base side center-section spacing in case heights are formed in the core of the spin base.
[Drawing 5] It is drawing of longitudinal section showing the configuration of the modification for making spacing of an ambient atmosphere cutoff member side clearance narrower than ambient atmosphere cutoff member side center-section spacing.
[Drawing 6] It is drawing of longitudinal section showing the configuration of the 2nd example equipment of this invention.
[Drawing 7] It is drawing of longitudinal section showing the configuration of the modification of the 2nd example equipment.
[Drawing 8] It is drawing of longitudinal section showing the configuration of the 3rd example equipment of this invention.
[Drawing 9] It is drawing of longitudinal section showing the configuration of the 4th example equipment of this invention.
[Drawing 10] It is drawing of longitudinal section showing the configuration of equipment conventionally.
[Description of Notations]
1 Spin Base
2 Revolving Shaft
3 Substrate Attachment Component
4 Spin Base Side Clearance
9 Spin Base Side Space
10 Gas Feed Hopper by the side of Spin Base
40, 40a, 40b Resistance member
W Substrate
J The predetermined shaft made to rotate a substrate
d1 Spacing of a spin base side clearance
d2 Spin base side center-section spacing

[Translation done.]

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